REMARKS

In response to the Office Action of April 1, 2003, Applicants respectfully request reconsideration. Claims 1-18 were previously pending in this application. By this amendment, Applicants are canceling claim 6 without prejudice or disclaimer.

Claim 1 has been amended to incorporate a limitation corresponding to claim 6. Amended claim 1 corresponds to cancelled claim 6, which was previously pending. Since no new issues are raised, entry of the amendment is respectfully requested.

The Office Action rejected claims 1-18 under 35 U.S.C. §103(a) as being unpatentable over Mills (6,088,355) in view of Byrn (5,533,020). Applicants respectfully traverse this rejection.

Mills is directed to ATM segmentation and reassembly. Mills discloses performing ATM reassembly by using a receive ring which stores an array of pointers. Each of the pointers specifies the address of a cell buffer on the host suitable for storing a received ATM cell. Software on the host periodically services the receive ring by sequentially stepping through the ring entries and linking the pointer for each cell into a chain of pointers maintained for the virtual channel indicator (VCI) on which that stored cell was received. Once the entire frame has been received, the host software uses the pointer to reassemble the frame. Segmentation operations are performed using a transmit ring and similar pointer based processing (Abstract).

Byrn is directed to an ATM cell scheduler. Byrn discloses assigning a unique queue ID (QID) to each virtual connection corresponding to a queue of cells (Col. 3, lines 52-54). When a cell is available for transmission, a target transmission time (TTT) is calculated for the cell (Col. 4, lines 3-5). A cell scheduling unit (CSU) includes a number of banks and each bank includes a number of circular queues called timing wheels (Col. 4, lines 36-40). Each timing wheel has an assigned priority, *p*, and a wheel rate, *r* (Col. 4, line 40). The wheel rate, *r*, indicates the rate at which the wheel shifts or rotates (e.g., one slot per 10 cell times) and corresponds to a particular virtual connection's transmission requirements (Col. 4, lines 40-45). A priority value and a wheel rate are also assigned to each cell (Col. 4, lines 54-56). A cell is placed in a wheel by placing the QID of the queue in which the cell is stored into the wheel that matches the cell's priority value, *p*, and wheel rate, *r* (Col. 4, lines 60-65). The position or slot in the wheel at which the QID of the cell is placed is determined based on the TTT of the cell. That is, the TTT

is compared to the current transmission time (CTT) and wheel rate *r*, to place the cell in a wheel slot which will allow the cell to be due for transmission when the TTT of the cell matches the CTT (Col. 4, line 65 – Col. 5, line 3).

All cells in a higher priority wheel with a TTT before or the same as the CTT are transmitted before the next priority queue is examined (Col. 5, lines 24-26). Byrn discloses that this may result in some jitter (Col. 5, lines 26-27). After the cell has been transmitted, the QID associated with that cell is removed from the current wheel position (Col. 5, lines 56-59).

Claim 1, as currently amended, is directed to a data transmission apparatus for transmitting data from a plurality of data streams over a data channel. The apparatus comprises: a data stream control memory for storing a scheduling variable for each data stream, each scheduling variable being indicative of a scheduled transmission timing for that data stream; a clock for maintaining a current timing indication; a data stream selector for, at substantially constant time intervals, comparing the scheduling variables stored in the memory and selecting the scheduling variable indicative of the earliest scheduled transmission timing and, if that scheduled transmission timing is not earlier than the current timing, generating an indication of the data stream corresponding to the selected scheduling variable and incrementing the selected scheduling variable; and a data transmission unit for receiving the indication of the data stream and transmitting an amount of data from that data stream over the data channel.

Neither Mills nor Byrn, taken alone or in combination, discloses or suggests a data stream selector for, at substantially constant time intervals, comparing the scheduling variables stored in the memory and selecting the scheduling variable indicative of the earliest scheduled transmission timing, as recited in claim 1.

As discussed above, Byrn discloses that a cell is transmitted when the CTT matches the time corresponding to the cell's position in the wheel. The wheels have different wheel rates, *r*. Thus, the time period between a first cell coming due for transmission and the next cell (i.e., the cell in the subsequent wheel position) in the wheel coming due for transmission is equal to wheel rate, *r*. However, the value of *r* varies depending upon which wheel is being evaluated. Further, any number of cells at a particular wheel position may have the same TTT. Thus, the interval between polling the TTT of the present cell of each wheel will occur

at irregular time intervals (i.e., based on the number of cells at a wheel location). Thus, the time interval between servicing subsequent cells in a wheel is not substantially constant.

In addition to varying time intervals between servicing different cells in the same wheel, the time interval between servicing different priority wheels may also vary. Byrn discloses that wheels with a higher priority and higher wheel rate are always serviced before wheels with a lower priority and lower wheel rate. Thus, the time between servicing a first wheel and servicing a second wheel is dependent upon the number of cells in the first wheel and the wheel rate of the first wheel. As these parameters may vary between wheels, the time periods between servicing two wheels is not substantially constant.

Further, Byrn acknowledges that servicing all cells in a higher priority wheel before servicing any cells in a lower priority wheel may result in some jitter. By contrast, comparing scheduling variables at substantially constant time intervals, as recited in claim 1, allows the data transmission apparatus to transmit data over the data channel at substantially regular intervals, with little jitter. As discussed at page 14, lines 6-14 of Applicants' specification, this is advantageous when transmitting, for example, encoded video streams. Reduced jitter allows smooth decoding of the video.

The Office Action asserts that Byrn discloses a reference clock that anticipates the time period between comparisons of the scheduling variable being substantially constant. Applicants respectfully disagree. The mere existence of a reference clock does not necessitate comparison of scheduling variables at substantially constant time intervals, as suggested by the Office Action. Indeed, the transmission reference clock disclosed by Byrn is used to record the CTT. Byrn discloses at Col. 5, lines 22-26 that the CTT is incremented after a cell is transmitted or the time to transmit a single cell at the link speed has elapsed. Thus, the transmission reference clock does not record the passing of real time nor does it output a particular timing frequency. Instead, it merely increments the value of the CTT.

Mills also fails to disclose or suggest a data stream selector for, at substantially constant time intervals, comparing the scheduling variables stored in the memory and selecting the scheduling variable indicative of the earliest scheduled transmission timing. As admitted by the Office Action, Mills altogether fails to disclose an ATM scheduler.

Thus, amended claim 1 patentably distinguishes over Mills and Byrn. Accordingly, it is respectfully requested that the rejection of claim 1 under 35 U.S.C. §103(a) be withdrawn.

Claims 2-5 and 7-18 depend from claim 1 and are patentable for at least the same reasons. Accordingly, it is respectfully requested that the rejection of claims 2-5 and 7-18 under 35 U.S.C. §103(a) be withdrawn.

CONCLUSION

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicants' attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,

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